

PHILIP MORRIS U. S. A.
INTER - OFFICE CORRESPONDENCE
Richmond, Virginia

To: P. F. Grantham

Date: July 1, 1992

From: C. T. Spielberg *CT*

Subject: EVALUATION OF ROD TO ROD BLEND VARIATION

OBJECTIVE:

To identify how much rod to rod variation exists in the cigarette blend components of Philip Morris USA products.

INTRODUCTION:

The measurement of blend components is performed in the Microscopy section utilizing acetone floatation and microscopic picking of materials.

TEST PLAN:

A. Sampling

1. The following four (4) brands were sampled to provide a variety of blends: Bristol FF 100, Cambridge Lowest 100, Marlboro KS, and Merit Ultra Lts KS.
2. For each brand, three (3) samples of 100 cigarettes were collected off of one (1) machine. These three samples were collected one (1) per shift, during a 24-hour period. Each sample was collected at a single point in time, other than immediately following start-up. Each sample was stored separately in a container.

B. RL, RCB, ES, & Tobacco Percentage Testing

Percentages of RL, RCB, and ES were determined by a picking procedure under a microscope. Each sample of 100 cigarettes were randomly sampled for 20 rods. These 20 rods were picked (center third of rod) and delivered 20 data points each of RL, RCB, and ES.

C. ET Percentage Testing

Percentage of ET was determined by acetone floatation. This procedure required 18 cigarettes for each run. Each sample of 100 cigarettes was randomly sampled for 4 samples of 18 rods which resulted in 4 runs.

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RESULTS:**A. ES**

The following table illustrates the mean, minimum, maximum, range, variance, and relative standard deviation (standard deviation as a percent of the mean) for the percent ES found in each of the brands sampled, including the Industry Monitor #14, from the data in the report dated February 6, 1992.

<u>STATISTIC</u>	<u>BRAND</u>				
	<u>IM#14</u>	<u>MR6</u>	<u>BI8</u>	<u>MU6*</u>	<u>CBL8*</u>
Mean	2.5	3.1	12.6	-	-
Minimum	1.6	1.0	7.6	-	-
Maximum	3.6	5.4	18.3	-	-
Range	2.0	4.4	10.7	-	-
Variance	0.37	1.40	4.14	-	-
Rel. St. Dev.	24.2%	37.9%	16.2%	-	-

(*Note: These brands contain no ES in the blends.)

B. RL

The following table illustrates the statistics for the percent RL found in each of the brands sampled, including the Industry Monitor #14.

<u>STATISTIC</u>	<u>BRAND</u>				
	<u>IM#14</u>	<u>MR6</u>	<u>BI8</u>	<u>MU6</u>	<u>CBL8</u>
Mean	15.5	15.8	11.5	15.2	10.5
Minimum	10.3	7.2	4.1	10.7	3.4
Maximum	20.8	29.3	21.9	24.8	17.1
Range	10.5	22.1	17.8	14.1	13.7
Variance	10.17	15.22	10.96	9.34	8.64
Rel. St. Dev.	20.6%	24.7%	28.7%	20.1%	28.0%

C. RCB

The following table illustrates the statistics for the percent RCB found in each of the brands sampled, including the Industry Monitor #14.

<u>STATISTIC</u>	<u>BRAND</u>				
	<u>IM#14</u>	<u>MR6</u>	<u>BI8</u>	<u>MU6</u>	<u>CBL8*</u>
Mean	6.8	6.9	4.1	6.6	-
Minimum	4.0	3.7	1.2	2.0	-
Maximum	9.6	12.4	7.7	10.5	-
Range	5.6	8.7	6.5	8.5	-
Variance	3.06	2.88	1.70	2.87	-
Rel. St. Dev.	25.9%	24.6%	32.2%	25.7%	-

(*Note: This brand contains no RCB in the blend.)

D. ET

The following table illustrates the statistics for the percent ET found in each of the brands sampled, including the Industry Monitor #14.

<u>STATISTIC</u>	<u>BRAND</u>				
	<u>IM#14</u>	<u>MR6</u>	<u>BI8</u>	<u>MU6</u>	<u>CBL8</u>
Mean	10.6	11.3	3.5	21.7	45.1
Minimum	9.5	10.5	3.0	21.0	40.1
Maximum	13.9	12.8	4.2	22.4	48.8
Range	4.4	2.3	1.2	1.4	8.7
Variance	1.37	0.49	0.17	0.18	5.12
Rel. St. Dev.	11.0%	6.2%	11.7%	1.9%	5.0%

E. TOB

The following table illustrates the statistics for the percent TOB found in each of the brands sampled, including the Industry Monitor #14. Tobacco percentage is the remainder of the sample after ES, RL, and RCB are picked and removed from the sample.

<u>STATISTIC</u>	<u>BRAND</u>				
	<u>IM#14</u>	<u>MR6</u>	<u>BI8</u>	<u>MU6</u>	<u>CBL8</u>
Mean	74.8	72.5	70.9	78.2	89.5
Minimum	70.8	41.2	47.3	68.5	82.9
Maximum	82.2	83.1	81.2	83.6	96.6
Range	11.4	41.9	33.9	15.1	13.7
Variance	10.90	65.51	36.31	11.92	8.43
Rel. St. Dev.	4.0%	11.2%	8.5%	4.4%	3.2%

F. COMPARISON OF VARIATION OF ALL COMPONENTS, ALL BRANDS SAMPLED

The following table illustrates the relative standard deviation (standard deviation as a percent of the mean) of the percentage found of each component in each of the four brands sampled, as well as the Industry Monitor #14 from the data reported in the report dated February 6, 1992.

<u>COMPONENT</u>	<u>RELATIVE STANDARD DEVIATION WITHIN BRAND</u>				
	<u>IM#14</u>	<u>MR6</u>	<u>BI8</u>	<u>MU6</u>	<u>CBL8</u>
ES	24.2%	37.9%	16.2%	-	-
RL	20.6%	24.7%	28.7%	20.1%	28.0%
RCB	25.9%	24.6%	32.2%	25.7%	-
ET	11.0%	6.2%	11.7%	1.9%	5.0%
TOB	4.0%	11.2%	8.5%	4.4%	3.2%

CONCLUSIONS:

As compared to the Industry Monitor #14, the brands analyzed had similar levels of variation in the components with respect to their mean levels. Certain exceptions include the percent ES found in Marlboro KS which had a much higher standard deviation relative to the mean at 37.9% than IM14 at 24.2%. ET, however showed better results for Merit Ultra Lights and Cambridge Lowest, both of which have higher inclusion levels of ET than IM14, Marlboro KS, or Bristol FF 100. The data illustrate the trend that the lower the inclusion level of a component, the more difficult it is to blend consistently (i.e., the higher the relative standard deviation of that component).

cc: Dr. R. A. Fenner
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